

Importance of Monoclonal Antibodies and Therapeutic Vaccines in Human Body

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DESCRIPTION

One of the body's own defense strategies is the production of antibodies, proteins that bind to specific antigens on the surface of cancer cells, marking them for destruction by immune cells. Researchers are designing antibodies that target specific antigens on cancer cells to boost the immune response, called monoclonal antibodies.

Monoclonal antibodies

Monoclonal antibodies are an example of active immunity and are used to treat cancer (breast, lymphoma and colorectal cancer) among many other diseases. Monoclonal antibodies can be used to block the production of abnormal proteins found in cancer cells, to bind to proteins on the surface of cancer cells, and to mark cells for destruction, or by inhibiting or slowing the pathways that cancer cells use to grow.

They can also be conjugated to therapeutic drugs that have cytotoxic effects on cancer cells. However, one caveat to consider is that for monoclonal antibodies to be effective, scientists must identify the exact antigen for the specific cancer cells present in the patient's body. This means that this treatment option is only effective for certain types of cancer.

Immune checkpoint inhibitors, as you may recall, work by slowing or stopping an overactive immune response with the potential to harm healthy cells in addition to the cancer cells that initiated the response. These inhibitors work by preventing T cells from interacting and thereby instigating an immune response against other cells.

Tumor cells use this mechanism to disable Tumor-Infiltrating Lymphocytes (TILs), preventing them from targeting tumor cells.

One of the most well-known pathways used by tumor cells is PD-1/PD-L1. The PD-1 receptor is expressed on the surface of activated T cells after binding with PD-L1 on the surface of healthy cells, a signal is sent to prevent T cells from attacking normal cells. Some tumor cells overexpress PD-L1 to bind to activated T cells and render them inactive and ineffective. Therapies that target immune system checkpoint inhibitors do not interact directly with tumor cells; they target either PD-1 or PD-L1 to inhibit binding, thereby enhancing the immune response against cancer cells.

Therapeutic vaccines

Therapeutic vaccines contain whole or fragments of cancer cells or antigens associated with a specific type of cancer. They are designed to expose the immune system to a specific antigen to stimulate an immune response to recognize and destroy cancer cells containing that antigen. A patient's immune cells can be removed and used to create a vaccine that is then injected back into the body to boost the immune response to inhibit cancer growth, shrink the tumor, prevent recurrence, and potentially eliminate cancer cells entirely. These vaccines can often be combined with other therapeutic agents to help boost the immune system.

Some cancers are also caused by viruses, for example strains of the Human Papilloma Virus (HPV) have been linked to cancers of the cervix, anus, throat, vagina, vulva and penis. Thus, vaccination of patient populations at high risk for certain cancers helps protect against infection and the potential development of related cancers. HPV vaccines have been shown to significantly reduce the chance of developing cervical cancer. These types of preventive vaccines do not directly target cancer cells because they have not yet formed.

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